



EFT-1000A

*Installation and
Operations Manual*

EFT-1000A Installation and Operations Manual

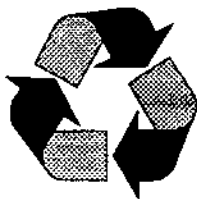
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This manual was written and designed by Renee Gibson.

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November 1993*



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SECTION 1

GENERAL INFORMATION

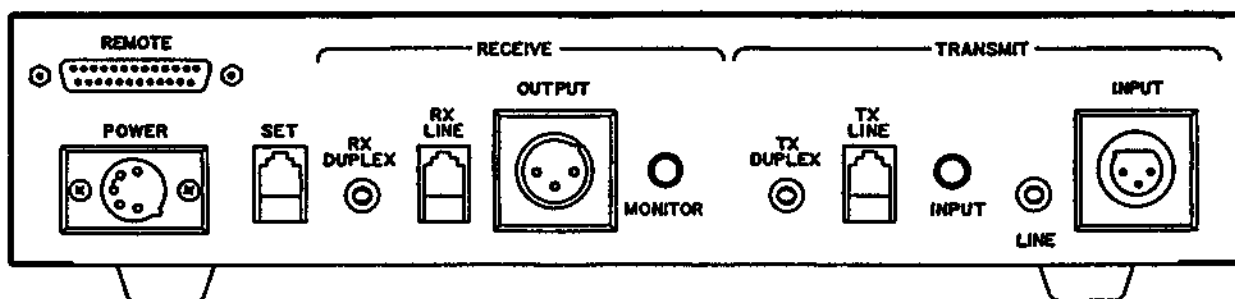
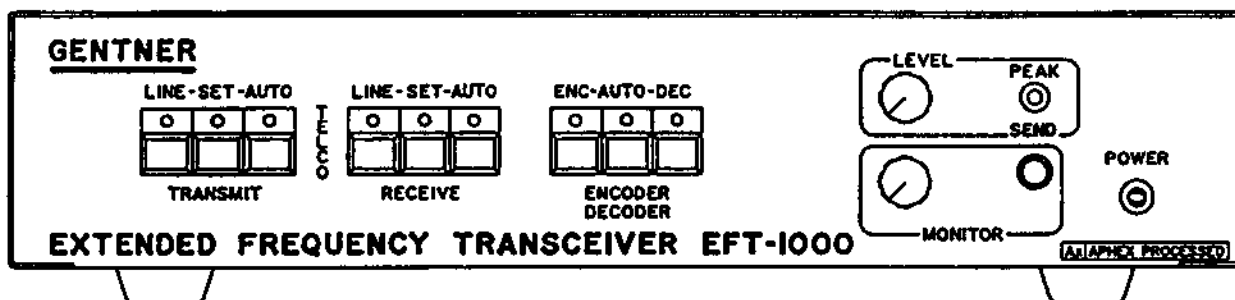
1.1 Introduction

The purpose of this manual is to acquaint you with the operational characteristics and maintenance of the GENTNER EFT-1000 Extended Frequency Transceiver. Even though this manual is referenced for quick research, a careful reading of the entire manual will ensure maximum performance and ease of operation.

1.2 Purpose of Equipment

The EFT-1000 is a portable, microprocessor controlled telephone system. This transceiver improves the quality of telephone remotes by recovering the low frequencies normally lost on telephone lines. Audio frequencies are shifted up by 250 Hz on the transmitting end and back down on the receiving end. This preserves the low frequencies, dramatically improving the quality of the broadcast.

1.3 Physical Specifications



There are two telephone line buttons on the EFT-1000, one called Transmit and the other Receive. These two buttons turn the telephone couplers ON and OFF. The telephone couplers make the physical connection between the EFT-1000 and the telephone line. The Switches labeled Set connect the Transmit or Receive telephone line to the telephone set that can be connected to the EFT via the rear panel Set modular jack. When a Set button is depressed, normal calls can be made on either phone line provided each line is wired to an active line. Depression of a Line switch cancels the Set command.

When depressed, the Transmit Auto and Receive Auto switches enable the internal coupler so that when called, the EFT-1000 will auto-answer, and then auto-disconnect when the call is completed.

The Send level control, and its associated bi-color LED, control and monitor the level of audio being sent down the phone line in the encode mode. The EFT was designed so that the red/green junction of the bi-color LED indicates a send level of -2 dBm. For best performance, adjust the send level pot so that the bi-color LED flashes green most of the time, and red on program peaks. This will avoid overdriving the telephone line.

There are two headphone jacks on the EFT-1000, one on the front panel and one on the rear panel. The Monitor level control adjusts the volume of both headset jacks.

The modular telephone jacks, labeled Tx Line and Rx Line, located on the back panel, are used to connect the unit to the telephone line(s). Another jack is provided, labeled Set, for a standard single line telephone set.

The input XLR and its associated Mic/line button are sources for sending audio down the phone line. Push the mic/line button in for mic level. The auxiliary input is used when another audio source is needed.

The receive output jack is used to connect the EFT to your equipments input. If the transmit and receive Duplex switches are not depressed, the Transmit line will have your send audio on it and you will listen on the Receive line. When you depress a duplex button, you can talk and listen on the same phone line. If both duplex switches are depressed, you will be able to talk and listen on both phone lines.

1.4 Electrical Specifications

Power: 120/240 VAC 50-60Hz 6 Watts
Input: Mic -55dBm Line 0dBm
Output: -15dBm into Telco
Encoder: Frequency Response 50-8KHz +/- .5dB
Frequency +250 Hz Comrex Compatible
Distortion < .1%
S/N Ratio > 60 dB
Decoder: Input -35dBm to +4 dBm Adjustable
Output 0 dBm into 600 Ohms
Frequency Shift -250 Hz Comrex Compatible
Distortion < .1%
S/N Ratio > 60 dB
Frequency Response
50-3.5KHz +/- .5dB W/Telco LPF In
50-8KHz +/- .5dB W/Telco LPF Out
Encode/Decode Switching: Automatic With internally Generated
and Decoded Standard Touchtones
Telco Interface: Auto Answer with Ring Voltage
30-120 VRMS 15-80Hz
Auto Disconnect

1.5 Warranty

GENTNER ENGINEERING COMPANY warrants that this product is free from defects in both materials and workmanship. Should any part of this equipment be defective, Gentner Engineering Company agrees, at its option, to:

A. Repair or replace any defective part free of charge (except transportation charges) for a period of one year from the date of the original purchase, provided the owner returns the equipment to Gentner Engineering Company at the address set forth below. No charge will be assessed for parts or labor during this period.

B. Replace or furnish replacement for any defective parts in the equipment for a period of one year from the date of original purchase. Replacement parts shall be furnished without charge except for labor and transportation.

This Warranty excludes assembled products not manufactured by Gentner Engineering Company, whether or not they are incorporated in a Gentner Engineering Company product or sold under a Gentner Engineering Company part or model number.

THIS WARRANTY IS VOID IF:

A. The equipment has been damaged by negligence, accident or mishandling, or has not been operated in accordance with the procedures described in the operating instructions; or,

B. The equipment has been altered or repaired by other than Gentner Electronics Corporation personnel or an authorized service representative of Gentner Electronics Corporation; or,

C. Adaptations or accessories other than those manufactured or provided by Gentner Electronics Corporation have been made or attached to the equipment which, in the determination of Gentner Electronics Corporation, shall have affected the performance, safety, or reliability of the equipment; or,

D. The equipment's original serial number has been modified or removed.

NO OTHER WARRANTY, EXPRESS OR IMPLIED, INCLUDING WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR USE, APPLIES TO THE EQUIPMENT, nor is any person or company authorized to assume any warranty for Gentner Electronics Corporation or any other liability in connection with the sale of Gentner products.

Gentner Electronics Corporation does not assume any responsibility for consequential damages, expenses or loss of revenue or property, inconvenience or interruption in operation experienced by the customer due to a malfunction in the purchased equipment. No warranty service performed on any product shall extend the applicable warranty period.

In case of unsatisfactory operation, the purchaser shall promptly notify Gentner Electronics Corporation at the address set forth below, in writing, giving full particulars as to the defects or unsatisfactory operation. Upon receipt of such notice, Gentner Electronics Corporation will give instructions respecting the shipment of the equipment, or such other manners as it elects to honor this warranty as above provided. This warranty does not cover damage to the equipment during shipping and Gentner Electronics Corporation assumes no responsibility for such damage. ALL SHIPPING COSTS SHALL BE PAID BY CUSTOMER.

THIS WARRANTY EXTENDS ONLY TO THE ORIGINAL PURCHASER AND IS NOT ASSIGNABLE OR TRANSFERABLE.

Gentner Electronics Corporation
P.O. Box 27647
Salt Lake City, Utah 84127-0647
(801) 975-7200

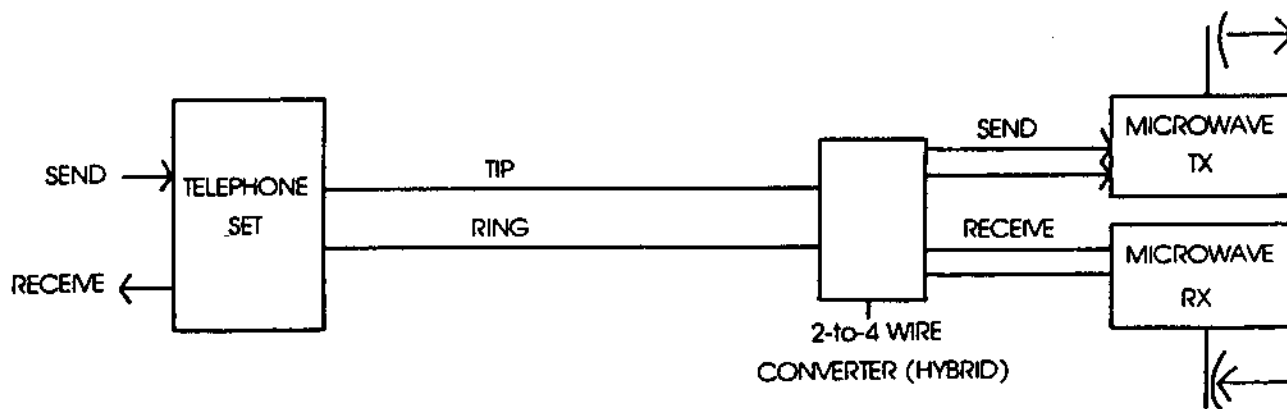


Figure 2.2 Tip and Ring Processing

Tip and Ring are brought from the local telephone central office (C.O.) to each users telephone equipment. As shown in figure 2.2 above, when the users tip and ring, the audio pair, reach the C.O. it is converted from two to four wires. This means that the send and receive audio are separated so that the C.O. can process the two sources of audio independently. The information is then sent, usually digitally, to other C.O.'s by cable, microwave, or satellite.

Since the customer has little control over what the telephone company does with calls once they reach the central office, a more detailed look at tip and ring will help explain the telephone's operation. At the C.O. the telephone company (Telco) places a D.C. voltage on tip and ring. This D.C. voltage, varying from 20 VDC to about 48 VDC, is usually provided by a trickle-charged battery which keeps the system operational during power outages. This electromotive force provides direct current for the telephone instrument to operate. When a call is made, a ring voltage of 105 VAC is provided by the C.O. to drive the ringer inside the telephone instrument. When you pick up the handset, the hook switch disconnects the ringer and connects the telephone set to the phone line. This process is known as terminating the line. Anytime a D.C. path of 600 Ohms or less is provided to tip and ring, the line will terminate and the call will be answered. When a call is completed, the reverse sequence of events occurs. As the C.O. senses disconnect, by detecting a change in the load across tip and ring, it usually reverses polarity of the D.C. voltage on the receiving phones tip and ring. (Some telephone systems simply supply dial tone without a D.C. reversal.) This stops the long distance billing if applicable and gives dial tone to the receiving caller. A more in-depth study of telephone basics can be obtained by purchasing a telephone theory book available through many outlets.

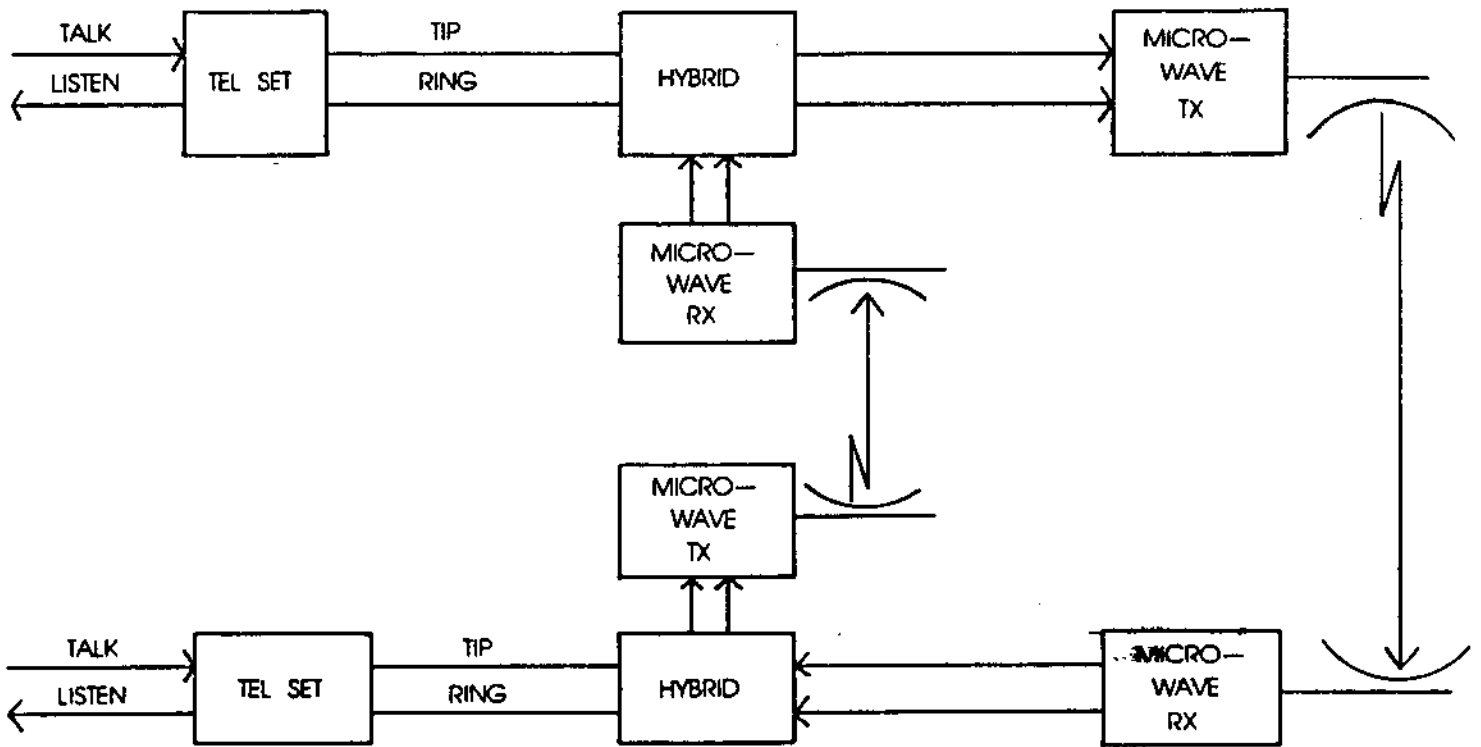


Figure 2.3 Telephone Transmission System

2.3 Hybrid Theory

An important part of any telephone system is the device that converts the two wire transmission into a separate transmit and receive pair. This is done by a hybrid. Hybrid coils separate send and receive audio. This allows independent control of caller and send audio.

SECTION 3

EFT-1000 THEORY OF OPERATION

3.1 Introduction

The EFT-1000 was designed to be compatible with the COMREX encode and decode system but have the added advantages of: 1. encoding and decoding with the same unit, 2. Increased frequency response because of the APHEX circuitry, 3. Two built-in telephone couplers, and 4. Ease of use. Care was taken in designing the EFT-1000 so that it would have a high signal to noise ratio, low distortion, and dissipate little power.

The EFT-1000 consists of five different printed circuit boards. Four of these boards are mounted inside the chassis of the processing unit and one board is employed as the power supply.

The EFT-1000 uses CMOS integrated circuits to create a low power consuming device. All other components were chosen because of their adherence to high standards in audio equipment. A discussion of the building blocks of each of these systems will now be discussed.

3.2 Microprocessor Theory

The EFT-1000 incorporates a Motorola MC146805 based microcomputer, which operates at a clock rate of 3.58 MHz. The MC146805 is U13 on the microprocessor card. A 27C16 EPROM (U2) houses the machine language program which provides the central processing unit with the necessary instructions to perform the proper tasks when an input is recieved. To support the ports of the MC146805 microprocessor, two MC146823 programmable input/output chips (U5,U6) are used.

The EFT-1000's microprocessor incorporates a DTMF receiver, an SSI202 (U9), and a MK5087 touchtone encoder (U7) which enables two EFT's to have handshake capabilities. The handshake process can be described as follows:

1. The remote EFT sends a "*" touchtone when in auto and when the phone line connection is terminated.
2. The local EFT responses with a "#" tone.
3. The remote EFT begins encoding and sends a "1" tone.
4. The local EFT begins decoding.

To exit the encode/decode mode a "0" tone is sent when either EFT's Auto Enc/Dec switch is depressed (LED off). This handshake process insures that both the local and remote ends have a complete duplex communication path. By tracing the path of the DTMF generator and decoder in the schematics in a following section a complete understanding of the handshake process can be obtained.

The following tables depict the Port and Bit assignments for each of the microprocessor inputs and outputs.

Microprocessor Port Assignment Table

MC146805 Microprocessor Ports (U13)

Port Address 1A

Bit	Identity	Silkscreen Label	IC Pin#	Description
0	Transmit Line Switch	Y	14	Active Low Input
1	Transmit Set Switch	Z	13	"
2	Transmit Auto Switch	AA	12	"
3	Transmit Duplex Switch	BB	11	"
4	Recieve Line Switch	CC	10	"
5	Recieve Set Switch	DD	9	"
6	Recieve Auto Switch	EE	8	"
7	Recieve Duplex Switch	FF	7	"

Port Address 1B

Bit	Identity	Silkscreen Label	IC Pin#	Description
0	Encode Switch	V	36	Active Low Input
1	Auto Enc/Dec Switch	W	35	"
2	Decode Switch	X	34	"
3	Data Valid TT Detect	K	33	Active High Signal
4	Data 0		32	
5	Data 1		31	
6	Data 2		30	
7	Data 3		29	

Microprocessor Port Assignment Table

MC146823 Parallel Interface Ports (U6)

Port Address 2A

Bit	Identity	Silkscreen Label	IC Pin #	Description
0	Transmit Auto Answer		4	Power-up Option
1	Recieve Auto Answer		5	Input From
2	Transmit Auto Disconnect		6	DIP Switches
3	Recieve Auto Disconnect		7	"
4	Transmit Start Auto		8	"
5	Recieve Start Auto		9	"
6	Enc/Dec Start Auto		10	"
7	Ring Count (1 or 6)		11	Off=1 On=6

Port Address 2B

Bit	Identity	Silkscreen Label	IC Pin#	Description
0	Ring Detect/Loop Sense Tx	L	34	Telephone Line
1	Ring Detect/Loop Sense Rx	M	33	Monitor
2	Touchtone Transmit	N	32	
3	Encoded Audio Transmit	P	31	Audio Path
4	Nonencoded Audio Transmit	R	30	Selection
5	Touchtone Recieve	S	29	"
6	Encoded Audio Recieve	T	28	"
7	Nonencoded Audio Recieve	U	27	"

Port Address 2C

Bit	Identity	Silkscreen Label	IC Pin#	Description
0	Row 1		3	Touchtone
1	Row 2		2	Encoder
2	Row 3		1	"
3	Row 4		39	"
4	Column 1		38	"
5	Column 2		37	"
6	Column 3		36	"
7	Column 4		35	"

Microprocessor Port Assignment Table

MC146823 Parallel Ports (U5)

Port Address 3A

Bit	Identity	Silkscreen Label	IC Pin#	Description
0	Transmit Hybrid Set	SS	4	Line Coupler
1	Transmit Hybrid Reset	TT	5	Line Decoupler
2	Recieve Hybrid Set	UU	6	Line Coupler
3	Receive Hybrid Reset	VV	7	Line Decoupler
4	Set to Recieve	WW	8	Enables Set
5	Set to Transmit	XX	9	Enables Set
6	Set on line	YY	10	Line Coupler
7	Set Off line	ZZ	11	Line Decoupler

Port Address 3B

Bit	Identity	Silkscreen Label	IC Pin#	Description
0	Transmit Line LED	PP	34	Report Back LED's
1	Transmit Set LED	NN	33	"
2	Transmit Auto LED	MM	32	"
3	Recieve Line LED	GG	31	"
4	Recieve Set LED	HH	30	"
5	Recieve Auto LED	JJ	29	"
6	Encode LED	KK	28	"
7	Auto Enc/Dec LED	LL	27	"

Port Address 3C

Bit	Identity	Silkscreen Label	IC Pin#	Description
0	Decode LED	RR	3	Report Back LED
1	Clear Ready TT Detect		2	TT Reciever Set
2	Dim Transmit	F	1	
3	Dim Recieve	E	39	
4	Monitor Decode	D	38	Monitor ON
5	Monitor Not Decode	C	37	Monitor OFF
6	Recieve line	B	36	Rx to monitor
7	Transmit line	A	35	Tx to monitor

Microprocessor Controls

Silkscreen Label*

- A Receive Line to Monitor
 - B Transmit Line to Monitor
 - C Monitor Not Decoded
 - D Monitor Decoded
 - E Dim Receive Line
 - F Dim Transmit Line
 - G DTMF Tones
 - H +5 VDC Supply
 - J Logic GND
 - K Touchtone Decoder Data Verify
 - L Ring Detect/Loop Sense Transmit Line
 - M Ring Detect/Loop Sense Receive Line
 - N Touchtone Transmit Line
 - P Encoded Transmit Line
 - R Nonencoded Transmit Line
 - S Touchtone Receive Line
 - T Encoded Receive Line
 - U Nonencoded Receive Line
 - V Encode Switch
 - W Auto Encode/Decode Switch
 - X Decode Switch
 - Y Transmit Line Switch
 - Z Transmit Set Switch
 - AA Transmit Auto Switch
 - BB Transmit Duplex Switch
 - CC Receive Line Switch
 - DD Receive Set Switch
 - EE Receive Auto Switch
 - FF Receive Duplex Switch
 - GG Receive Line LED
 - HH Receive Set LED
 - JJ Receive Auto LED
 - KK Encode LED
 - LL Auto Encode/Decode LED
 - MM Transmit Auto LED
 - NN Transmit Set LED
 - PP Transmit Line LED
 - RR Decode LED
 - SS Transmit Hybrid Set
 - TT Transmit Hybrid Reset
 - UU Receive Hybrid Set
 - VV Receive Hybrid Reset
 - WW Set to Receive
 - XX Set to Transmit
 - YY Set on Line
 - ZZ Set Off Line
- ** All EFT PC boards are clearly marked with this silkscreen.

3.3 Telephone Interface

The EFT-1000 has connections for two separate telephone lines. Just because one line is labeled "transmit" and one "receive" it doesn't mean that the lines need to be dedicated for that purpose. The transmit and receive telephone circuitry are mirror images. The main parts of an EFT-1000's telephone interface are the relays, the hybrid coils, and the opto-isolators.

The EFT-1000 uses four DIP Omron G6AK234-P dual coil relays to provide the connection to the phone line(s). The two coils are needed because of the need to set and reset each relay. On the transmit and receive lines, relays K1 and K2, one side of the coil is pulled to +5VDC and the other is used by the microprocessor to couple onto the tip and ring. Since there is only one Set jack the relays K3 and K4 perform a slightly different task. Relay K3 enables either the receive or the transmit set to be energized when the front panel control is depressed and relay K4 provides the physical connection to the line.

The EFT-1000 utilizes two PREM SPT-183 coils as its transformer couplers. The discrete components around the coils, and the phase relationship between windings, account for a 10 dB attenuation between the receive and transmit audio. This null adequately blocks most return loss to provide an undistorted send audio path.

The opto-isolators, MCA 11G1's, designed into the EFT are used to detect when loop current is flowing through the primaries of the coils. These isolators convert the loop current into a logic level to inform the microcomputer of the status of each line. Refer to the electrical drawings for a better perception of the telephone interface circuitry.

3.4 Inputs

The EFT-1000 implements the following inputs: 1. An XLR for a microphone, 2. A 1/4" phono jack for an auxiliary input, 3. Three standard modular telephone jacks, and 4. A DB-25 connector to provide remote control.

The send XLR balanced input, J11, can be either line level or microphone level. The choice between mic or line level is determined by the position of the mic/line switch (S1A). This switch determines the amount of gain the input has, either 55dB for mic level input or 0dB for line input. The auxiliary input, J10, is line level and is only adjustable by the external gear you are using.

The modular telephone jacks, RJ-11's, are made for a slim wire, four conductor line. These are readily available from any electronics outlet.

The EFT-1000 is remotable with the exception of level controls. The rear panel DB-25 connector has all of the front panel controls brought out as well as a connection to each front panel LED and the digital supply. The following table shows the pinouts of this connector.

Remote Pin Out

Pin #	Function	Pin #	Function	Pin #	Function
1	Line Sw Xmit	9	Decode Switch	17	Line LED Rcv
2	Set Sw Xmit	10	GND	18	Set LED Rcv
3	Auto Sw Xmit	11	+5VDC	19	Auto LED Rcv
4	Line Sw Rcv	12	N.C.	20	Encoder LED
5	Set Sw Rcv	13	N.C.	21	Auto Enc/Dec LED
6	Auto Sw Rcv	14	Line LED Xmit	22	Decode LED
7	Encode Sw	15	Set Led Xmit	23	GND
8	Auto Enc/Dec Sw	16	Auto LED Xmit	24	+5VDC
				25	N.C.

*Note: The Switches (Sw) are active LOW and the Remote LED's should be pulled HIGH through a current limiting resistor.

3.5 Outputs

The EFT-1000 contains the following outputs: two balanced 1/4" stereo headphone jacks, J3 and J8, and a three pin male XLR, J7. The level of both monitor jacks is controlled by the audio tapered pot located on the front of the EFT. This headphone amplifier circuitry consists of U16, a LF351 Op Amp, a MJE180 NPN power transistor, and a MJE 170 PNP power transistor. It is constructed in a common Class B push-pull arrangement.

The Output XLR on the rear of the EFT is driven by a balanced mixer comprised of two 5532 operational amplifiers, U3A and U3B. It is the connector provided to make the connection between your equipment and the EFT-1000.

3.6 Switches and LEDs

To be user friendly the EFT-1000 incorporates switches and report back LEDs to relay instructions to the microcomputer and indicate status. The nine front panel switches tie directly to ports of the microprocessor. They are momentary ITT Shadow switches. The mic/line switch and both duplex switches are two pole-double throw latching switches. The power switch is a four pole double throw latching switch. A discussion of the mic/line and duplex switches has already been given in previous sections. The power switch connects the rectified power supply to the input PC boards +15 VDC, -15 VDC, and +5 VDC regulators.

The LEDs are of an assorted color. They have series current limiting resistors of 330 Ohms to limit the current flow to between 10-20 milliamps.

A two position switch is included on the power supply itself if the unit is to be used in a 240VAC setting.

3.7 Upshift and Downshift

The EFT-1000 employs the phasing method to create a single sideband transmission and applying this to balanced mixers for modulation. This is done by phase shifting the carrier and the intelligence 90 degrees.

The various building blocks of the EFT-1000's Encode/Decode board include clock/divider circuitry, data stored in a 27C16 EPROM, latches, phase filters, digital to analog converters, balanced mixers, and an APHEX hybrid integrated circuit.

The master clock of the Encode/Decode process is set by a 4.032 MHz Crystal. This input frequency is tuned to +/-10 Hz by a parallel trimmer capacitor C1. The clock frequency is divided by 64 by U1 a 74HC4060 binary divider, to have an output frequency of 63 KHz. This pulse is sent to two more binary counters, U8 and U14 the 74HC163's, for further frequency division. The resultant clock rates are used in the creation of both a 126 sample digital sine and digital cosine wave. These two waves are also controlled by the data stored inside the 27C16 EPROM which is U2.

Two eight bit latches, U9 and U10 (74HC374's), are used to distinguish between the cosine and sine waveforms. On a positive transition of the clock the sine waveform is being latched onto the inputs of the digital to analog converters, U5, U6, U11 and U12 which are all PM-7533 DAC's. On the negative transitions the cosine waveform is latched on the DAC's inputs.

The physical trigometric frequency shift is performed by operational amplifiers, LF347's, biased as all-pass filters. The poles of each filter were chosen so that the necessary 90 degrees of phase shift occurs over the entire audible frequency spectrum. By using trigometric identities the calculations for each capacitor and resistor value needed were obtained. The programmable DIP's installed with one percent resistors are used to set the corner frequencies because of the tolerance levels of electronic capacitors.

The digital-to-analog converters used on the EFT-1000 give ten bits of resolution when used as implemented. This along with the latching process of distinguishing between sine and cosine waves, and the implementation of a compander, mathematically drops the noise floor to -54dB. The resistor feed back properties of DAC's help exact the cancellation of the unused sideband.

The APHEX circuitry was added to the EFT to enhance the restoration of frequencies lost over telephone transmission mediums. The APHEX in essence restores two more octaves of otherwise lost intelligence.

SECTION FOUR

DIAGRAMS

4.1 Introduction

This section of this manual contains information proprietary to Gentner Engineering Company. Some diagrams are only shown in block form.

A discussion of each integrated circuit used in the EFT-1000 will also be given.

These diagrams are also included in the following pages:

- 4-1. EFT-1000 Interconnection Diagram
- 4-2. EFT-1000 Input Card Electrical Schematic (2)
- 4-3. EFT-1000 Microprocessor Card Electrical Schematic
- 4-4. EFT-1000 Encode/Decode Card Block Diagram
- 4-5. EFT-1000 Power Supply Electrical Schematic
- 4-6. EFT-1000 Switch Card Electrical Schematic

4.2 Component Pin Outs

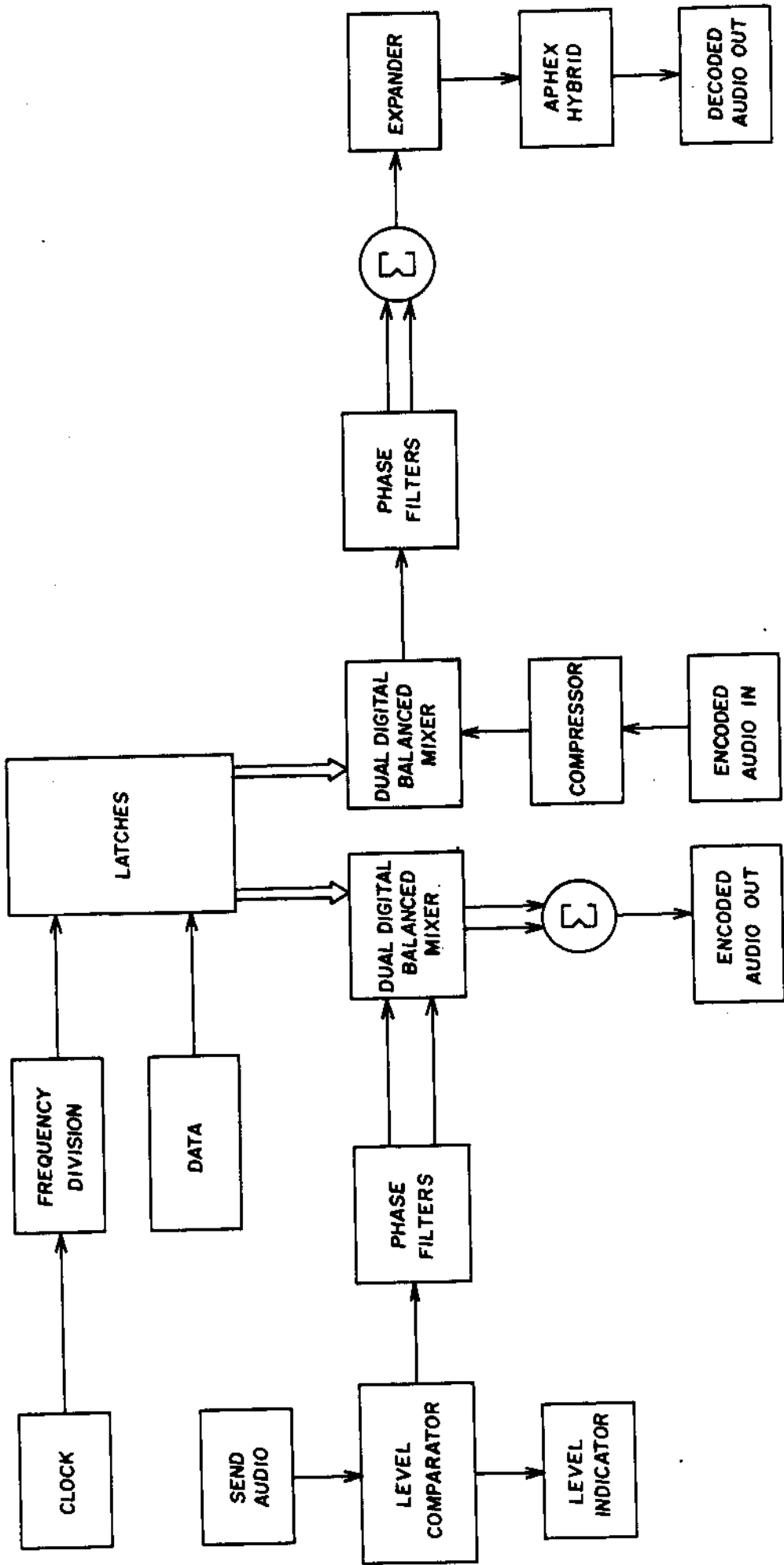
This section details the connections of the integrated circuits used in the EFT-1000. It is included as a reference guide as well as a troubleshooting help.

Part	Manufacturer	Application
AN7805		+5V Regulator
Pinout: 1: Input, 2: GND, 3: Output		
AN7815		+15V Regulator
Pinout: 1: Input, 2: GND, 3: Output		
AN7915		-15V Regulator
Pinout: 1: GND, 2: Input, 3: Output		
CD4066	RCA, National	Quad Bilateral Switch
Pinout: 1: In/OutA		
2: Out/InA		
3: Out/InB		
4: In/OutB		
5: Ctrl B		
6: Ctrl C		
7: Vss		
14: VDD		
13: Ctrl A		
12: Ctrl B		
11: In/OutD		
10: Out/InD		
9: Out/InC		
8: In/OutC		
LF347	National	Quad Op Amp
Pinout: 1: OutputA		
2: +A Input		
3: -A Input		
4: +V Supply		
5: +B Input		
6: -B Input		
7: OutputB		
14: OutputD		
13: -D Input		
12: +D Input		
11: -V Supply		
10: +C Input		
9: -C Input		
8: OutputC		
LF351	National	Op Amp
Pinout: 1: Balance		
2: - Input		
3: + Input		
4: -V Supply		
8: N.C.		
7: +V Supply		
6: Output		
5: Balance		
MCA11G1		Opto-Isolator
Pinout: 1: +V Supply		
2: -V Supply		
3: NC		
6: NC		
5: Vout		
4: GND		
MC146805	Motorola	Microprocessor
Pinout: 1: Reset		
2: IRQ		
3: LI		
4: DS		
5: R/W		
6: AS		
7-14: PA7-PA0		
15-19: A12-A8		
20: GND		
21-28: B7-B0		
29-36: PB7-PB0		
37: Timer		
38: OSC1		
39: OSC2		
40: +V Supply		

Part	Manufacturer	Application
MCI46823	Motorola	Programmable I/O
Pinout:	1-3: PC2-PC0 4-11: PA0-PA7 12-19: AD0-AD7 20: GND	21: CE 22: AS 23: R/W 24: DS 25: Reset 26: IRQ 27-34: PB7-PB0 35-39: PC7-PC3 40: VDD
MJE170		PNP Transistor
Pinout:	1: Emitter, 2: Base, 3: Collector	
MJE180		NPN Transistor
Pinout:	1: Emitter, 2: Base, 3: Collector	
MK5087	Intel	Touchtone Generator
Pinout:	1: +V Supply 2: 3: Column 1 4: Column 2 5: Column 3 6: GND 7: OSC 8:	16: Output 15: ST1 14: Row 1 13: Row 2 12: Row 3 11: Row 4 10: 9: Column 4
NE5532	Signetics	Dual Op Amp
Pinout:	1: Output A 2: -A Input 3: +A Input 4: -V Supply	8: +V Supply 7: Output B 6: -B Input 5: +B Input
SSI202	Silicon Systems	DTMF Reciever
Pinout:	1: D0 2: Hex 3: EN 4: In633 5: VP 6: 7: GND 8: XEN 9: ANA In 10: GND	11: 12: XIn 13: 14: DV 15: CRLDY 16: D3 17: D2 18: D1 19: 20: Vcc
ULN2003	Sprague, TI	Transistor Array
Pinout:	1: InA 2: InB 3: InC 4: InD 5: InE 6: InF 7: InG 8: Common	16: OutA 15: OutB 14: OutC 13: OutD 12: OutE 11: OutF 10: OutG 9: Common
27C16	Intel	2K x 8 EPROM
Pinout:	1: 1-8: A7-A0 9-11: O0-O2 12: GND 13-17: O3-O7	18: CE 19: A10 20: OE 21: Vp-p 22: A9 23: A8 24: Vcc

Part	Manufacturer	Application
74HC04	National	CMOS Inverter
Pinout:	1: A1	14: Vcc
	2: Y1	13: A6
	3: A2	12: Y6
	4: Y2	11: A5
	5: A3	10: Y5
	6: Y3	9: A4
	7: GND	8: Y4
74HC74	National	Dual D Flip-Flop
Pinout:	1: CLR1	14: Vcc
	2: D1	13: CLR2
	3: CLK1	12: D2
	4: PR1	11: CLK2
	5: Q1	10: PR2
	6: Q1	9: Q2
	7: GND	8: Q2
74HC123A	National	Dual Re-triggerable Multivibrator
Pinout:	1: A1	16: Vcc
	2: B1	15: RExt/CExt1
	3: CLR1	14: CExt1
	4: Q1	13: Q1
	5: Q2	12: Q2
	6: CExt2	11: CLR2
	7: RExt/CExt	10: B2
	8: GND	9: A2
74HC132	National	Quad 2-Input NAND
Pinout:	1: A1	14: Vcc
	2: B1	13: B4
	3: Y1	12: A4
	4: A2	11: Y4
	5: B2	10: B3
	6: Y2	9: A3
	7: GND	8: Y3
74HC138	National	3-to-8 Line Decoder
Pinout:	1: Select A	16: Vcc
	2: Select B	15: DO 0
	3: Select C	14: DO 1
	4: Enable G2A	13: DO 2
	5: Enable G2B	12: DO 3
	6: Enable G1	11: DO 4
	7: Y7 Output	10: DO 5
	8: GND	9: DO 6

Part	Manufacturer	Application
74HC163	National	Synchronous Binary Counter
Pinout:	1: Clear	16: Vcc
	2: Clock	15: RC Output
	3: DI A	14: Output A
	4: DI B	13: Output B
	5: DI C	12: Output C
	6: DI D	11: Output D
	7: Enable P	10: Enable T
	8: GND	9: Load
74HC373	National	Tri-State Octal D-Type Latch
Pinout:	1: Output Control	20: Vcc
	2: 1Q	19: 8Q
	3: 1D	18: 8D
	4: 2D	17: 7D
	5: 2Q	16: 7Q
	6: 3Q	15: 6Q
	7: 3D	14: 6D
	8: 4D	13: 5Q
	9: 4Q	12: 5D
	10: GND	11: Latch Enable
74HC374	National	Tri-State Octal D-Type Flip-Flop
Pinout:	1: Output Control	20: Vcc
	2: 1Q	19: 8Q
	3: 1D	18: 8D
	4: 2D	17: 7D
	5: 2Q	16: 7Q
	6: 3Q	15: 6Q
	7: 3D	14: 6D
	8: 4D	13: 5D
	9: 4Q	12: 5Q
	10: GND	11: Clock
74HC4060	National	14 Stage Binary Counter
Pinout:	1: Q12	16: Vcc
	2: Q13	15: Q10
	3: Q14	14: Q8
	4: Q6	13: Q9
	5: Q5	12: Reset
	6: Q7	11: Clock
	7: Q4	10: Clock 1
	8: GND	9: Clock 2
7533	PM	DAC
Pinout:	1-2: I Out	14: Vcc
	3: GND	15: VRef
	4-13: Bit1-Bit10	16: RFB



SECTION 5

MAINTENANCE

5.1 Introduction

The EFT-1000 is a highly specialized, and sophisticated device. Its repair and maintenance should be left to qualified technicians. The EFT-1000 contains CMOS integrated circuits so great care must be taken to static ground yourself before servicing.

5.2 General Treatment

The EFT-1000 is made for remote broadcasts and the people who work remotes. Care should be taken in transporting this equipment. We suggest investing in a foam packed briefcase if your EFT-1000 is to travel extensively.

5.3 Encoded Source

Gentner Engineering maintains a demo rack with an EFT-1000 on line fed with a audio source. This EFT will auto-answer when phone number (801) 974-3746 is accessed. This source will allow EFT owners to decode upshifted audio on a phone line per normal operating conditions.

5.4 Troubleshooting

A short study of problems encountered with EFT-1000 operation will now be given. Please call Gentner Engineering Customer Service at (801) 975-7200, if problems arise with your EFT that don't have a simple cure.

<u>Problem</u>	<u>Possible Cause(s)</u>	<u>Repair Procedure</u>
No Monitor Audio	Duplex not Enabled Bad Regulator Dead Input Card CMOS	Engage Duplex Switch Check Supply Levels Replace CD4066's
Front Display Dead	Loose Connector Microprocessor Card Installed Incorrectly Dead Latch	Check Placement of Ribbon Cables Correct Installation Change 74HC373
Display Won't Power Up to Programmed Options	DIP Switch not Enabled Remote Shorted	Check Programming Check Input Card- Microprocessor Card Continuity

<u>Problem</u>	<u>Possible Causes:</u>	<u>Repair Procedure</u>
No SET Dial Tone	Relay not Energizing Bad Supply Bad Port Chip Bad Line Connection	Replace Relay Check Supply Levels Replace U5 MC146823 Check Installation
No LINE Dial Tone	Relay Not Energizing Bad Port Chip Bad Line Connection	Replace Relay Replace U5 MC146823 Check Installation
EFT's Won't Handshake	Double Terminated Telephone Line Dead CMOS Logic Check Send Level Bad TT Generator Bad TT Reciever	Rx and Tx Lines Cannot Have Handset Off Hook Replace U12, U13 CD4066's Send Level Can't Over Power TT Replace MK5087 Monitor U9 SSI202 Pin #14 (DV) HIGH Level should be seen as TT's are recieved
Distorted Audio	Bad Latches Poorly Adjusted APHEX Poorly Adjusted Master Clock Trimmer Cap	Replace 74HC374's Readjust APHEX Tune Clock Freq. =4.032 MHz Pin #9 of U1 (74HC4060)

SECTION 6

PARTS DATA

6.1 Introduction

The EFT-1000 contains low noise, low power integrated circuits. This section includes a complete parts list as well as the parts associated GENTNER Part number.

The order replacement parts contact Gentner Engineering Customer Service in Salt Lake City, Utah at (801) 268-1117.

6.2 Recommended Spare Parts

The following parts should be kept on hand to decrease down time should a system fail.

<u>Quantity</u>	<u>Part</u>	<u>Gentner Part Number</u>
2	250V Varistors	544-150-001
10	CD4066 Bilateral Switches	533-204-066
1	AN7805 +5V Regulator	543-007-805
1	AN7815 +15V Regulator	543-007-815
1	AN7915 -15V Regulator	543-007-915
4	74HC374 Latches	533-200-374
1	74HC4060 Divider w/Clock	533-204-060
1	74HC373 Latch	533-200-373
5	LF347 Op Amps	540-300-347
1	MC146805E2 Microprocessor	533-146-805
2	MC146823 I/O Chips	533-146-823
1	SSI202 DTMF Reciever	533-551-202
1	MK5087 TT Generator	533-105-087

6.3 Input PC Board Parts

<u>Designation</u>	<u>Gentner Part</u>	
<u>Symbol</u>	<u>Number</u>	<u>Description</u>
CR1-CR13	501-004-148	IN4148 Diode
V1-V2	544-150-001	V250LA2A Varistor
R1	514-010-273	27K Ohm Resistor
R2	514-010-104	100K Ohm Resistor
R3	514-010-104	100K Ohm Resistor
R4	514-010-823	82K Ohm Resistor
R5	514-010-103	10K Ohm Resistor
R6	514-010-823	82K Ohm Resistor
R7	514-010-103	10K Ohm Resistor
R8	514-010-273	27K Ohm Resistor
R9	514-010-103	10K Ohm Resistor
R10	514-010-103	10K Ohm Resistor

** All Resistors are 1/4, 5% Unless Otherwise Specified

Designation Symbol	Gentner Part Number	Description
R11	514-010-103	10K Ohm Resistor
R12	510-013-100	10K Ohm Resistor 1%
R13	510-013-100	10K Ohm Resistor 1%
R14	510-011-301	301 Ohm Resistor 1%
R15	510-013-100	10K Ohm Resistor 1%
R16	510-013-100	10K Ohm Resistor 1%
R17	510-011-301	301 Ohm Resistor 1%
R18	521-400-103	10K Audio Taper Mod Pot
R19	514-010-153	15K Ohm Resistor
R20	514-010-331	330 Ohm Resistor
R21	514-010-153	15K Ohm Resistor
R22	514-010-303	30K Ohm Resistor
R23	514-010-103	10K Ohm Resistor
R24	514-010-100	100 Ohm Resistor
R25	514-010-100	100 Ohm Resistor
R26	514-010-151	150 Ohm Resistor
R27	514-010-151	150 Ohm Resistor
R28	510-013-200	20K Ohm Resistor 1%
R29	510-014-100	100K Ohm Resistor 1%
R30	510-013-100	10K Ohm Resistor 1%
R31	510-013-200	20K Ohm Resistor 1%
R32	510-014-100	100k Ohm Resistor 1%
R33	510-013-100	10K Ohm Resistor 1%
R34	510-013-249	24.9K Ohm Resistor 1%
R35	510-013-249	24.9K Ohm Resistor 1%
R36	514-010-203	20K Ohm Resistor
R37	510-013-100	10K Ohm Resistor 1%
R38	510-011-604	604 Ohm Resistor 1%
R39	510-013-249	24.9K Ohm Resistor 1%
R40	514-010-103	10K Ohm Resistor
R41	510-013-249	24.9K Ohm Resistor 1%
R42	510-011-301	301 Ohm Resistor 1%
R43	514-010-103	10K Ohm Resistor
R44	514-010-103	10K Ohm Resistor
R45	514-010-222	2.2K Ohm Resistor
R46	514-010-203	20K Ohm Resistor
R47	514-010-124	120K Ohm Resistor
R48	514-010-124	120K Ohm Resistor
R49	514-010-273	27K Ohm Resistor
R50	510-011-604	604 Ohm Resistor 1%
R51	514-010-391	390 Ohm Resistor
R52	514-010-104	100K Ohm Resistor
R53	514-010-562	5.6K Ohm Resistor
R54	510-011-604	604 Ohm Resistor 1%
R55	514-010-103	10K Ohm Resistor
R56	514-010-010	1 Ohm Resistor
R57	514-010-010	1 Ohm Resistor
R58	514-010-390	39 Ohm Resistor

** All Resistor are 1/4W, 5% Unless Otherwise Specified

Designation Symbol	Gentner Part Number	Description
R59	514-010-103	10K Ohm Resistor
R60	514-010-203	20K Ohm Resistor
R61	514-010-124	120K Ohm Resistor
R62	514-010-124	120K Ohm Resistor
R63	514-010-273	27K Ohm Resistor
R64	510-011-604	604 Ohm Resistor 1%
R65	514-010-391	390 Ohm Resistor
R66	514-010-104	100K Ohm Resistor
R67	514-010-562	5.6K Ohm Resistor
R68	510-011-604	604 Ohm Resistor 1%
R69	514-010-103	10K Ohm Resistor
R70	514-010-010	1 Ohm Resistor
R71	514-010-010	1 Ohm Resistor
R72	514-010-390	39 Ohm Resistor
R73	514-010-103	10K Ohm Resistor
R74	510-011-604	604 Ohm Resistor 1%
R75	510-012-665	6.65K Ohm Resistor 1%
C1	601-900-002	100uF N.P. Cap
C2	601-900-002	100uF N.P. Cap
C3	605-100-064	.001uF 100V Cap
C4	601-900-002	100uF N.P. Cap
C5	605-100-604	.001uF 100V Cap
C6	603-050-044	100pF 50V Cap
C7	601-016-158	10uF 16V Cap
C8	601-900-002	100uF 16V Cap
C9	601-900-002	100UF 16v Cap
C10	605-100-064	.001uF 100V Cap
C11	605-100-064	.001uF 100V Cap
C12	605-100-064	.001uF 100V Cap
C13	605-100-064	.001uF 100V Cap
C14	605-100-064	.001uF 100V Cap
C15	601-900-001	2.2uF 50V N.P. Cap
C16	612-050-032	220pF 50V Cap
C17	605-100-064	.001uF 100V Cap
C18	601-900-001	2.2uF 50V N.P. Cap
C19	612-050-032	220pF 50V Cap
C20	601-900-001	2.2uF 50V N.P. Cap
C21	601-900-001	2.2uF 50V N.P. Cap
C22	603-050-112	.1uF 50V Cap
C23	601-025-180	100uF 25V Cap
C24	603-050-112	.1uF 50V Cap
C25	603-050-112	.1uF 50V Cap
C26	601-025-180	100uF 25V Cap
C27	603-050-112	.1uF 50V Cap
C28	603-050-112	.1uF 50V Cap
C29	601-025-180	100uF 25V Cap
C30	603-050-112	.1uF 50V Cap
C31	603-050-112	.1uF 50V Cap

** All Resistors are 1/4W, 5% Unless Otherwise Specified

Designation Symbol	Gentner Part Number	Description
C32	601-900-001	2.2uF 50v Cap
C33	601-900-001	2.2uF 50V Cap
C34	601-900-001	2.2uF 50V Cap
C35	603-050-112	.1uF 50V Cap
C36	603-050-128	.47uF 50V Cap
C37	603-050-112	.1uF 50V Cap
C38	603-050-128	.47uF 50V Cap
C39-C60	603-050-112	.1uF 50V Cap
Q1	561-400-186	MJE180 NPN Transistor
Q2	561-400-187	MJE170 PNP Transistor
T1-T2	552-100-003	PREM SPT-183 Transformer
FB1-FB14	558-073-101	10-50 MHz Shield Ferrite Bead
K1-K4	556-702-005	Omron G6AD234-P Dip Relay
U1	540-300-347	LF347
U2	540-300-347	LF347
U3	540-305-532	NE5532
U4-U5	535-201-101	MCA11G1
U6	533-204-066	CD4066
U7	533-200-004	74HC04
U8	533-204-066	CD4066
U9	540-300-347	LF347
U10	533-204-066	CD4066
U11	540-300-347	LF347
U12-U14	533-204-066	CD4066
U15	533-200-004	74HC04
U16	540-300-351	LF351
VR1	543-007-815	AN7815
VR2	543-007-915	AN7915
VR3	543-007-805	AN7805
J1	678-200-013	26 Post Pin Strip
J2	673-002-009	9 Post .10C Header
J3	662-200-001	1/4" Phone Jack
J4	673-002-006	6 Post .10C Header
J5-J6	676-000-006	PCB Mount Tele Jack
J7	664-400-003	3 Pin PCB Mount XLR
J8	662-200-001	1/4" Phone Jack
J9	676-000-006	PCB Mount Tele Jack
J10	662-200-001	1/4" Phone Jack
J11	664-300-003	3 Pin PCB Mount XLR
A-G	678-150-007	7 Pin Strip
HJK	678-150-003	3 Pin Strip
L-U	678-150-008	8 Pin Strip
V-ZZ	678-150-028	28 Pin Strip

Designation Symbol	Gentner Part Number	Designation
S1-S3	621-250-001	2 Pole Double Throw Sw
S4	621-250-002	4 Pole Double Throw Sw
	570-000-008	8 Pin Tin IC Socket
	570-000-014	14 Pin Tin IC Socket
	570-000-016	16 Pin Tin IC Socket
	573-200-015	TO-220 Heat Sink
	681-010-404	PPH 4-40 1/4" Screw
	681-010-606	PPH 6-32 3/8" Screw
	682-010-060	6-32 Nut
	683-040-612	6-32 3/4" Round Standoff
	684-050-060	#6 Washer Internal Tooth
	720-055-001	PCB EFT-1000 Input Board
	740-055-006	Pot Bracket

6.4 Encode/Decode Board Parts List

Designation Symbol	Gentner Part Number	Description
R1	514-010-102	1K Ohm Resistor
R2	514-010-106	10M Ohm Resistor
R3	510-013-100	10K Ohm Resistor 1%
R4	510-012-255	2.55K Ohm Resistor 1%
R5	514-010-513	51K Ohm Resistor
R6	514-010-133	13K Ohm Resistor
R7	510-012-825	8.25K Ohm Resistor 1%
R8	514-010-224	220K Ohm Resistor
R9	514-010-104	100K Ohm Resistor
R10	514-010-224	220K Ohm Resistor
R11	514-010-104	100K Ohm Resistor
R12-R13	510-013-100	10K Ohm Resistor 1%
R14	514-010-221	220K Ohm Resistor
R15-R22	510-013-100	10K Ohm Resistor 1%
R23-R26	510-013-121	12.1K Ohm Resistor 1%
R27-R34	510-013-100	10K Ohm Resistor 1%
R35-R38	510-013-121	12.1K Ohm Resistor 1%
R39-R43	510-013-100	10K Ohm Resistor 1%
R44	510-013-121	12.1K Ohm Resistor 1%
R45	510-013-100	10K Ohm Resistor 1%
R46	510-013-121	12.1K Ohm Resistor 1%
R47-R48	510-013-100	10K Ohm Resistor 1%
R49	510-013-121	12.1K Ohm Resistor 1%
R50-R51	510-013-100	10K Ohm Resistor 1%
R52	510-013-121	12.1K Ohm Resistor 1%
R53-R58	510-013-100	10K Ohm Resistor 1%
R59	510-013-121	12.1K Ohm Resistor 1%
R60	510-013-100	10K Ohm Resistor 1%

** Resistors are 1/4W, 5% Unless Noted Otherwise

Designation Symbol	Gentner Part Number	Description
R61	510-013-121	12.1K Ohm Resistor 1%
R62-R63	510-103-100	10K Ohm Resistor 1%
R64	510-013-121	12.1K Ohm Resistor 1%
R65-R66	510-013-100	10K Ohm Resistor 1%
R67	510-013-121	12.1K Ohm Resistor 1%
R68-R74	510-013-100	10K Ohm Resistor 1%
R75-R76	514-010-682	6.8K Ohm Resistor
R77	510-013-100	10K Ohm Resistor 1%
R78-R81	510-012-825	8.25K Ohm Resistor 1%
R82	510-013-100	10K Ohm Resistor 1%
R83	514-010-682	6.8K Ohm Resistor
R84	514-010-562	5.6K Ohm Resistor
R85	514-010-133	13K Ohm Resistor
R86-R87	510-013-100	10K Ohm Resistor 1%
R88	514-010-154	150K Ohm Resistor
R89	514-010-202	2K Ohm Resistor
R90	522-400-103	10K Linear Trim Pot
R91	510-013-100	10K Ohm Resistor 1%
S01-S03	510- -	Selected 1% Resistors
C1	604-000-002	40pF Trimmer Cap
C2	607-050-010	22pF 50V Cap
C3	603-050-112	.1uF 50V Cap
C4	601-050-136	1uF 50V Cap
C5	601-050-146	3.3uF 50V Cap
C6	608-050-134	.82uF Metal Film Cap
C7	608-050-112	.1uF Metal Film Cap
C8	608-050-092	.015uF Metal Film Cap
C9	608-050-074	.0027uF Metal Film Cap
C10	608-050-120	.22uF Metal Film Cap
C11	608-050-102	.039uF Metal Film Cap
C12	608-050-084	.0068uF Metal Film Cap
C13	607-050-040	680pF 50V Cap
C14-C17	601-900-002	100uF 16V N.P. Cap
C18	608-050-120	.22uF Metal Film Cap
C19	608-050-102	.039uF Metal Film Cap
C20	608-050-084	.0068uF Metal Film Cap
C21	608-050-040	680pF Metal Film Cap
C22	608-050-134	.82uF Metal Film Cap
C23	608-050-112	.1uF Metal Film Cap
C24	608-050-092	.015uF Metal Film Cap
C25	608-050-074	.0027uF Metal Film Cap
C26	605-100-084	.0068uF 100V Cap
C27	605-100-076	.0033uF 100V Cap
C28	605-100-084	.0068uF 100V Cap
C29	605-100-076	.0033uF 100V Cap
C30	605-100-084	.0068uF 100V Cap
C31	605-100-076	.0033uF 100V Cap

** Resistors are 1/4W, 5% Unless Otherwise Noted

Designation Symbol	Gentner Part Number	Description
C32-C33	605-100-084	.0068uF 100V Cap
C34	601-050-158	10uF 50V Cap
C35	603-050-112	.1uF 50V Cap
C36	601-050-158	10uF 50V Cap
C37-C71	603-050-112	.1uF 50V Cap
Q1-Q2	561-103-906	2N3906 PNP Transistor
Y1	583-180-400	4.032MHz Crystal
U1	533-204-060	74HC4060
U2	537-201-002	Programmed 27C16
U3-U4	540-300-347	LF347
U5-U6	535-300-001	PM7533GP DAC
U7	540-300-347	LF347
U8	533-200-163	74HC163
U9-U10	533-200-374	74HC374
U11-U12	535-200-001	PM7533GP DAC
U13	540-300-347	LF347
U14	533-200-163	74HC163
U15	533-200-004	74HC04
U16-U17	533-200-074	74HC74
U18-U20	540-300-347	LF347
U21	533-200-123	74HC123
U22-U23	540-300-347	LF347
J1	673-005-009	9 Post .10C RA Header
J2	673-005-006	6 Post .10C RA Header
LPF	678-200-002	2 Post Berg Pin Strip
LPF	678-250-001	Berg Strip Jumper Block
S01	678-600-008	8 Pin DIP Jumper Plug
S02-S03	678-600-016	16 Pin DIP Jumper Plug
	570-000-008	8 Pin Tin IC Socket
	570-000-014	14 Pin Tin IC Socket
	570-000-016	16 Pin Tin IC Socket
	570-000-020	20 Pin Tin IC Socket
	570-450-002	24 Pin Gold IC Socket

6.5 Microprocessor Board Parts

Designation Symbol	Gentner Part Number	Description
R1	514-010-102	1K Ohm 5%,1/4W Resistor
R2	514-010-106	10M Ohm 5%,1/4W Resistor
R3	518-010-103	100K SIP
R4	514-010-103	10K Ohm 5%,1/4W Resistor
R5	514-010-104	100K Ohm 5%,1/4W Resistor
R6	514-010-472	4.7K Ohm 5%,1/4W Resistor
C1-C2	612-025-011	30pF 25V Cap
C3	601-050-146	303uF 50V Cap
C4	605-050-088	.01uF 50V Cap
C5-C17	603-050-112	.1uF 50V Cap
Y1	583-180-358	3.58MHz Crystal
U1	533-200-138	74HC138
U2	537-201-003	Programmed 27C16
U3	533-200-373	74HC373
U4	533-200-132	74HC132
U5-U6	533-146-823	MC146823P
U7	533-105-087	MK5087
U8	533-204-060	74HC4060
U9	533-551-202	SSI202P
U10-U12	535-102-003	ULN2003
U13	533-146-805	MC146805E2
A-G	678-160-007	7 Pin Socket Strip
HJK	678-160-003	3 Pin Socket Strip
L-U	678-160-008	8 Pin Socket Strip
V-ZZ	678-160-028	28 Pin Socket Strip
S1	620-100-008	8 Switch DIP
	570-000-016	16 Pin Tin IC Socket
	570-000-018	18 Pin Tin IC Socket
	570-450-014	14 Pin Gold IC Socket
	570-450-016	16 Pin Gold IC Socket
	570-450-020	20 Pin Gold IC Socket
	570-450-024	24 Pin Gold IC Socket
	570-450-040	40 Pin Gold IC Socket

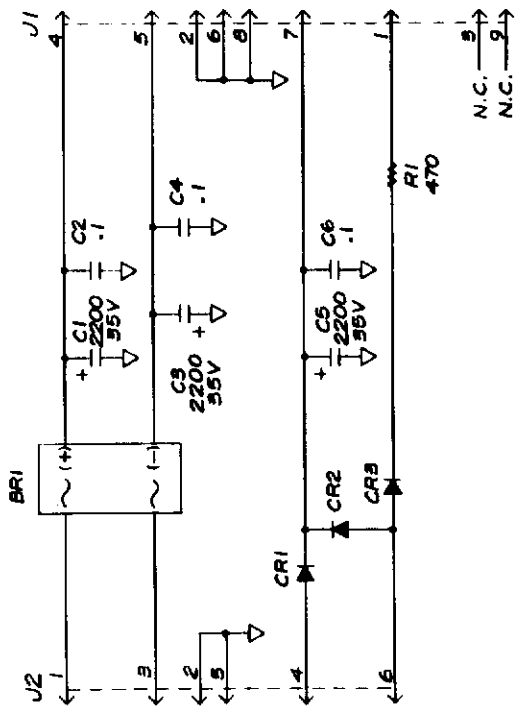
6.6 Switch Board Parts

Designation Symbol	Gentner Part Number	Description
R1	518-010-104	100K SIP
R2-R10	514-010-331	330 Ohm 5%, 1/4W Resistor
J1	678-200-013	13 Post Pin Strip
S1	621-221-002	ITT Shadow Sw Red LED
S2	621-221-008	ITT Shadow Sw Yellow LED
S3	621-221-004	ITT Shadow Sw Green LED
S4	621-221-002	ITT Shadow Sw Red LED
S5	621-221-008	ITT Shadow SW Yellow LED
S6	621-221-004	ITT Shadow Sw Green LED
S7	621-221-002	ITT Shadow Sw Red LED
S8	621-221-004	ITT Shadow Sw Green LED
S9	621-221-002	ITT Shadow Sw Red LED

6.7 Power Supply Board Parts

Designation Symbol	Gentner Part Number	Description
CR1-CR3	500-004-004	1N4004 Diode
BR1	506-200-002	2A 200V Rectifier
R1	514-010-471	470 Ohm 5%, 1/4W Resistor
C1	600-035-208	2200uF 35V Cap
C2	603-050-112	.1uF 50V Cap
C3	600-035-208	2200uF 35V Cap
C4	603-050-112	.1uF 50V Cap
C5	600-035-208	2200uF 35V Cap
C6	603-050-112	.1uF 50V Cap
J1	673-002-009	9 Post .10C Header Strip
J2	673-002-006	6 Post .10C Header Strip

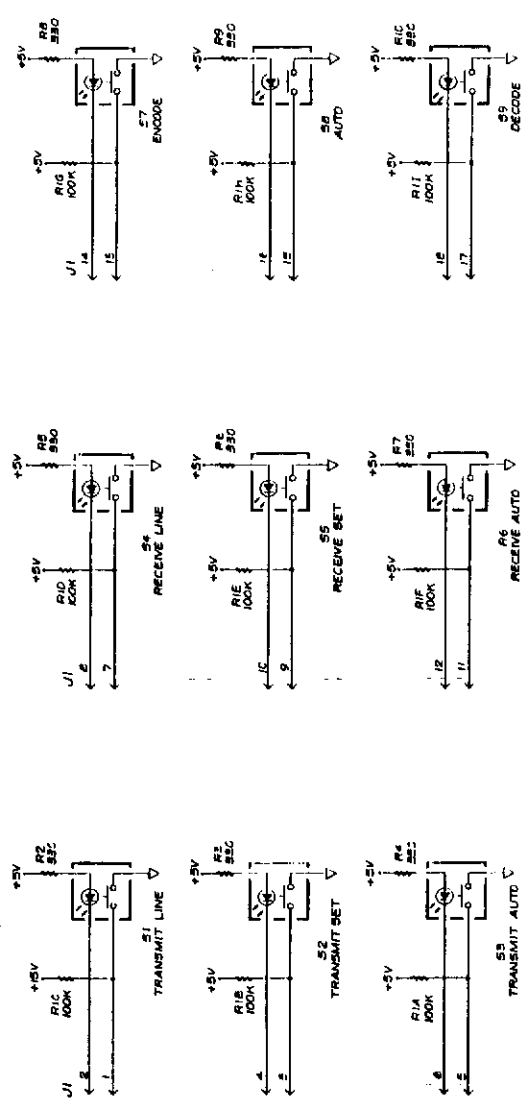
ENGINEERING CHANGE ORDER STATUS			
REV.	DESCRIPTION	CHECKED	DRAWN APPR.
1	PROD. RELEASE	4/12	4/12



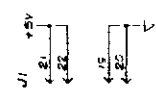
- NOTES:
- 1. UNLESS OTHERWISE SPECIFIED:
 - A. FIXED RESISTORS ARE 1/4 WATT.
 - B. RESISTANCE VALUES ARE IN OHMS, ± 5%.
 - C. CAPACITANCE VALUES ARE IN MICROFARADS.
 - D. DIODES ARE IN4004.

THIS DOCUMENT CONTAINS INFORMATION PROPRIETARY TO GENTNER AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS WITHOUT THE WRITTEN PERMISSION OF GENTNER ELECTRONICS CO., INC.	DESIGN NO.	DESCRIPTION	REF. DESIG.	REVISIONS
	EFT-1000	POWER SUPPLY CARD		
DRAWN BY: <i>Henry B. ...</i>		TITLE		
CHECKED BY: <i>Henry B. ...</i>		ELECT. SCHEM., EFT-1000		
APPROVED BY:		POWER SUPPLY CARD		
USED ON:	SCALE:	DATE:	SIZE:	REV:
EFT-1000			C	1 OF 1
(DO NOT SCALE THIS DRAWING)				

ENGINEERING CHANGE ORDER STATUS	
REV	DESCRIPTION
1	CONSTRUCTION RELEASE
2	CHECKED
3	DESIGN
4	APPV.

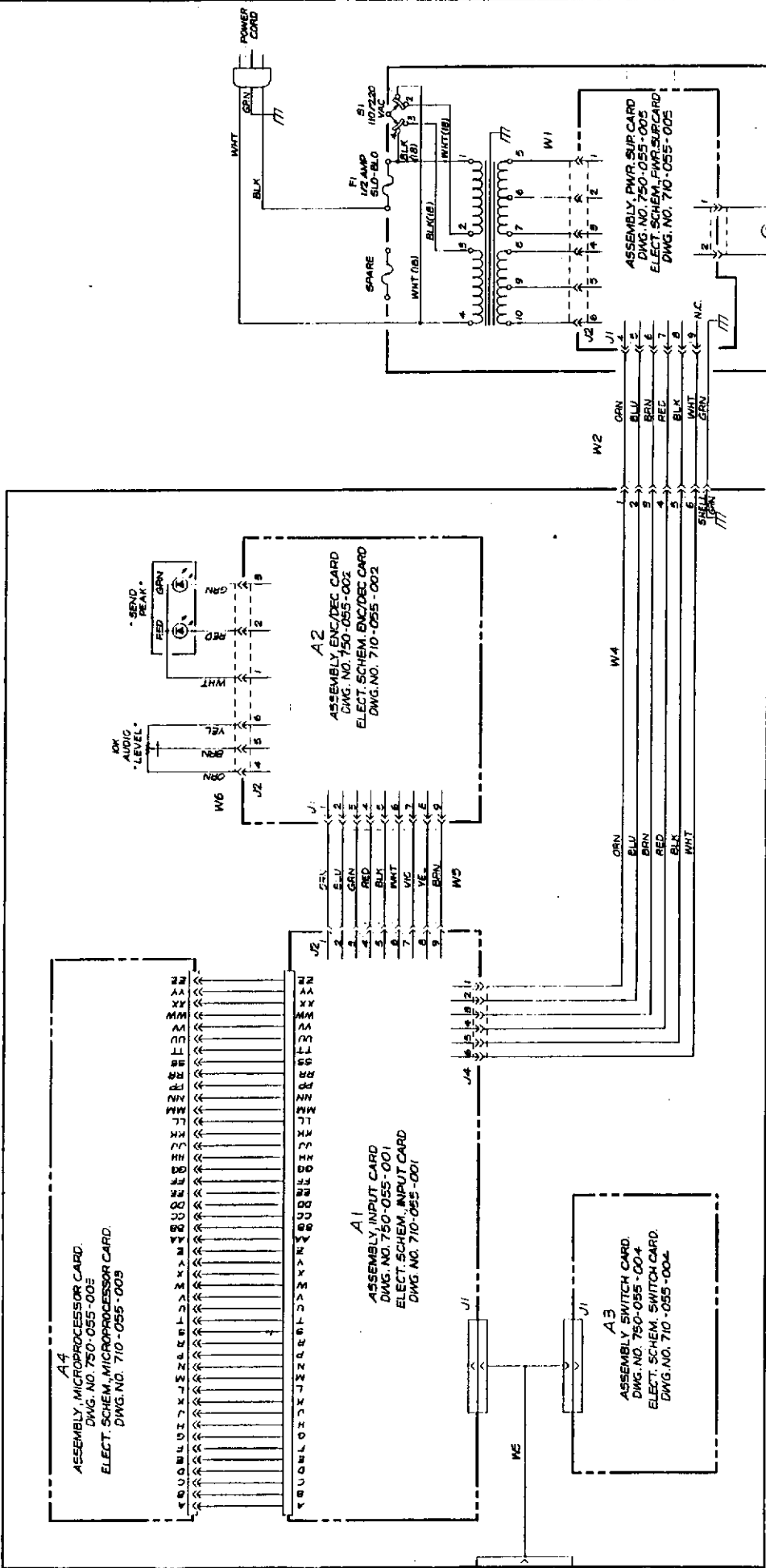


NOTES:
 1. UNLESS OTHERWISE SPECIFIED:
 A. FIXED RESISTORS ARE 1/4 WATT.
 B. RESISTANCE VALUES ARE IN OHMS, 2.5% TOL.
 C. VOLTAGE IS D.C.



DATE	REV	DESCRIPTION	REF DESIG	REVISIONS
		DESIGNED BY: <i>John P. ...</i>		
		CHECKED BY: <i>...</i>		
		APPROVED BY: <i>...</i>		
TITLE ELECT. SCHEM., EFT-1000 SW. CARD			PART NO. 710-055-004	
USED ON EFT-1000			SCALE 1:1	
UNLESS OTHERWISE SPECIFIED: RESISTORS ARE 1/4 WATT RESISTANCE VALUES ARE IN OHMS, 2.5% TOL VOLTAGE IS D.C. (DO NOT SCALE THIS DRAWING)				

REV.	DESCRIPTION	CHECKED (Name)	DATE
1	REVISED	W.P.	10/1/71
2	REVISION	W.P.	10/1/71



ASSEMBLY, EFT-1000 CHASSIS; DWG. NO. 750-055-012

ASSEMBLY, PWR. SUP. CARD
 DWG. NO. 750-055-005
 ELECT. SCHEM. PWR. SUP. CARD
 DWG. NO. 710-055-005

ASSEMBLY, EFT-1000 POWER SUPPLY CHASSIS
 DWG. NO. 750-055-012

DESIGNED BY	W.P.
CHECKED BY	W.P.
DATE	10/1/71

SCALE: 1:1

EFT-1000

GENVIEW
 INFORMATION COMMUNICATIONS, INC.

INTERCONNECTION DIAGRAM,
 EFT-1000

DWG. NO. 710-055-012

REV. 1 OF 1

WARRANTY

GENTNER COMMUNICATIONS CORPORATION (Manufacturer) warrants that this product is free of defects in both materials and workmanship. Should any part of this equipment be defective, Manufacturer agrees, at its option, to:

A. Repair or replace any defective part free of charge (except transportation charges) for a period of one year from the date of the original purchase, provided the owner returns the equipment to the Manufacturer at the address set forth below. No charge will be made for parts or labor during this period;

B. Furnish replacement for any defective parts in the equipment for a period of one year from the date of original purchase. Replacement parts shall be furnished without charge, except labor and transportation.

This Warranty excludes assembled products not manufactured by Manufacturer whether or not they are incorporated in a Manufacturer product or sold under a Manufacturer part or model number.

THIS WARRANTY IS VOID IF:

A. The equipment has been damaged by negligence, accident, act-of-God or mishandling, or has not been operated in accordance with the procedures described in the operating and technical instructions; or,

B. The equipment has been altered or repaired by other than Manufacturer or an authorized service representative of Manufacturer; or,

C. Adaptations or accessories other than those manufactured or provided by Manufacturer have been made or attached to the equipment which, in the determination of Manufacturer, shall have affected the performance, safety or reliability of the equipment; or,

D. The equipment's original serial number has been modified or removed.

NO OTHER WARRANTY, EXPRESS OR IMPLIED, INCLUDING WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR USE, APPLIES TO THE EQUIPMENT, nor is any person or company authorized to assume any warranty for Manufacturer or any other liability in connection with the sale of Manufacturer's products.

Manufacturer does not assume any responsibility for consequential damages, expenses or loss of revenue or property, inconvenience or interruption in operation experienced by the customer due to a malfunction in the purchased equipment. No warranty service performed on any product shall extend the applicable warranty period.

In case of unsatisfactory operation, the purchaser shall promptly notify Manufacturer at the address set forth below in writing, giving full particulars as to the defects or unsatisfactory operation, upon receipt of such notice, Manufacturer will give instructions respecting the shipment of the equipment, or such other matters as it elects to honor this warranty as above provided. This warranty does not cover damage to the equipment during shipping and Manufacturer assumes no responsibility for such damage. All shipping costs shall be paid by customer.

This warranty extends only to the original purchaser and is not assignable or transferable.

Gentner

GENTNER COMMUNICATIONS CORPORATION

1825 West Research Way
Salt Lake City, Utah 84119
Telephone: (801) 975-7200
Facsimile: (801) 977-0087